REMARKS

This paper is in response to the office action dated March 24, 2004. Claims 1, 3-7, 9-12, 29-32, 34-37, and 39-41 are pending. Applicants request reconsideration in light of the following remarks, and withdrawal of the outstanding rejections of the claims.

In the office action the Examiner rejected all claims under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,635,310 to Kudo et al. (hereinafter "Kudo"). Applicants contend that all the claims are patentable over Kudo, and request withdrawal of the rejections under 35 U.S.C. §102(b).

It is respectfully submitted that the Office Action does not meet the criteria for establishing a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the applied reference must teach or suggest all the claim limitations. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Further, the fact that the claimed invention is within the capabilities of one of ordinary skill in the art is not sufficient by itself to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. See MPEP §2143.

The Kudo reference fails to anticipate Applicants' invention for several reasons.

First, Kudo contains a disclosure of making a dielectric thin film product rather than making a semiconductor or a photovoltaic cell, as defined in Applicants' claims. One of the key characteristics of semiconductors and

photovoltaic cells is their ability to conduct electricity. Absent this property, semiconductors and photovoltaic cells would not be able to perform their intended purpose. In contrast, the term "dielectric" describes a material that does NOT conduct electricity. It is well known that dielectrics are non-conducting materials. The terms "semiconductor" and "photovoltaic cell" do not appear in the Kudo disclosure. Applicants' claims define more than a process step of depositing a compound onto a substrate. The claims define a method of making a semiconductor or a photovoltaic cell. Therefore, since there is no disclosure of any method for making semiconductors or photovoltaic cells, Kudo does not anticipate or make obvious Applicants' independent claims.

A second reason that Kudo does not anticipate Applicants' invention is that Kudo does not make any reference to depositing a layer that is doped. The Kudo disclosure identifies a method of making an alloy into which atoms of oxygen and nitrogen are introduced, e.g., ZnS. As is well known in semiconductor science, "doping" refers to the introduction of foreign, or dopant, atoms into a semiconductor in such as way as to increase the electrical conductivity. A wide-band-gap semiconductor such as ZnS (or ZnTe or ZnO) is a dielectric when it is not doped. The fact that Kudo describes the thin-film product as a dielectric implies that the oxygen and nitrogen atoms enter the semiconductor in bonding or lattice positions that do not produce doping. Therefore the resulting film is alloyed but not doped. Therefore, since there is no disclosure of any layers that are doped, Kudo does not anticipate or make obvious Applicants' independent claims.

Third reason that Kudo does not anticipate Applicants' invention is that even if the method of Kudo were used to make a doped layer, the doped layer would not be a p-type layer as defined in Applicants' claims. This is because the presence of oxygen together with nitrogen in Kudo's process will prevent the materials from becoming p-type. Kudo teaches sputtering ZnS in the

presence of **both** oxygen and nitrogen to apply its intended layer of material. As Table 1 of the Kudo reference shows, and as repeatedly discussed in the text, the films in Kudo always have large amounts of oxygen (4% to 7%) and at least some of this oxygen comes from the composition of the target as well as the oxygen gas. Because oxygen is very electronegative, the presence of even small amounts of oxygen will be sufficient to prevent the deposited layer from becoming p-type (i.e., containing positive charge carriers). Thus, Kudo's use of pure ZnO would be viewed by an artisan skilled in the art to necessarily result in n-type doping (if doping were to occur at all) even when group V elements such as nitrogen are introduced as dopants. Therefore to anyone skilled in the art, the practice of starting with targets having some oxygen and then reactively sputtering with both nitrogen and oxygen would never yield p-type material. As a consequence, Kudo fails to teach a method for making p-type layers, and for this reason, Kudo fails to anticipate or make obvious Applicants' independent claims.

Since the Kudo reference fails to anticipate Applicants' independent claims for any one or more of the three reasons above, for at least this reason all of Applicants' dependent claims are also patentable.

Claims 6 and 12 are also independently patentable because Kudo does not disclose or suggest a sputtering step that is capable of creating a layer larger than about 4 cm^2. In the Office Action the Examiner stated that Applicants have not stated any problem or purpose for this limitation. Prior art methods for depositing such layers are severely limited in commercial usefulness because only small substrates can be effectively coated. Since the invention is a method of making a semiconductor or a photovoltaic cell, it is clear that the advantage of making a layer larger than 4 cm^2 would be the ability to make larger products such as solar panels or modules without having to assemble them from smaller, discrete photovoltaic cells, as is currently done with conventional, crystalline silicon cells. Being limited to a layer deposition size

of 4 cm^2 would obviously hinder practical commercial efficiency. Accordingly, Applicants request withdrawal of the rejections of claims 6 and 12.

As an additional consideration regarding claims 6 and 12, it appears that the process disclosed in Kudo is not capable of scaling up to larger sizes, to achieve deposition of layers much larger than 4 cm^2. This is because Kudo discloses opposed targets for the RF sputtering apparatus. See column 3, line 23. This geometry requires the two sputter sources to face each other and they cannot be very far apart or the H field will be too weak. Therefore this geometry cannot scale up to square meter sizes. Further, this opposed target configuration is also known to yield very slow deposition rates and would not be considered industrially viable for large area production.

In view of the above remarks, Applicants have shown that the invention, as defined in the claims, is neither disclosed nor suggested by the references of record. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of record, and allowance of all claims.